Subject code	Credits
INF5007	6

Course title in Lithuanian

NEURONINIAI TINKLAI

Course title in English

NEURAL NETWORKS

Short course annotation in Lithuanian (up to 500 characters)

Kurse nagrinėjami mokymo su mokytoju ir be mokytojo algoritmai, dirbtinių neuroninių tinklų pritaikymai: klasifikavimas ir prognozavimas panaudojant dirbtinius neuroninius tinklus, prognozavimo ir klasifikavimo tikslumo rodikliai ir jų įvertinimas, duomenų ir parametrų kiekio santykis, modeliavimas naudojant dirbtinius neuroninius tinklus; realių neuroninių sistemų funkcionavimo principai, biologinių neuronų ir jų formuojamų tinklų savybės, mokymasis ir atmintis biologinių neuronų tinkluose, neuroninių sistemų pritaikymas robotikoje.

Short course annotation in English (up to 500 characters)

Students learn principles of artificial and biological neural networks, methods of analysis and modelling of neural systems, application of principles of neural systems in robotics; will be developing practical skills of application of artificial neural networks to data analysis and system modelling, biological neural system modelling, get some practice with robots.

Prerequisites for entering the course

Mathematical analysis and Linear algebra, Machine learning

Course aim

To understand neural network theory and be able to apply in real-world tasks.

Content

No.	Content (topics)
1.	Neuroinformatics.
2.	Neural networks in biological systems.
3.	Unsupervised learning. Hebb's learning rule. Associative and autoassociative memory.
4.	Supervised learning. Single-layer perceptron.
5.	Multi-layer perceptron. Back-propagation learning.
6.	Overtraining. Performance accuracy evaluation.
7.	Feature extraction and selection.
8.	Radial Basis Neural networks.
9.	Learning Vector Quantization.
10.	Support vector machines.
11.	Reinforcement learning. Policy gradient learning. Neuronal robot control
12.	Presentation of project results.

Distribution of workload for students (contact and independent work hours)

Lectures	**30 hours**
Seminars	**4 hours**
Laboratory work	**26 hours**
Individual students work	**100 hours**
Total:	**160 hours**

Structure of cumulative score and value of its constituent parts

Final written exam (50%), mid-term written exam (17%), and assessments of laboratory work and seminars (33%).

Recommended reference materials

No.	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	*Self-study rooms*	*Other libraries*
Basic materials						
1.	1994	S. Haykin. Neural Networks: A Comprehensive Foundation.	IEEE Press/Macmillan	1		

			College Publishing Company, New York,			
2.	2001	Š. Raudys. Statistical and Neural Classifiers: An integrated approach to design	Springer, London	1		
3.	2014	M.T.Hagan, H.W.Demuth. Neural Network Design. http://hagan.okstate.edu/NNDesign.pdf		eBook	eBook	eBook
Supplementary materials						
1.	1999	Koch, C. Biophysics of Computation: Information Processing in Single Neurons	Oxford University Press: New York, New York,	1		

Course programme designed by

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